PRESERVICE SCHOOL PERSONNEL'S KNOWLEDGE OF STIMULANT MEDICATION AND ADHD

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ABSTRACT

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most commonly diagnosed disorders among children today. Stimulants are commonly prescribed to children with ADHD to improve attention span and decrease distractibility, hyperactivity, and impulsivity. Given the increased use of stimulant medication, school personnel need to be aware of the implications and limitations of the stimulant medications on a child's academic and behavioral performance. In this study, pre-service school personnel's awareness of the symptoms and causes of ADHD and the effects of stimulant medication was examined using a13 item questionnaire developed by Snider, Busch, and Arrowood (2003). Further, the differences in knowledge levels between the Graduate and Undergraduate students were examined. The sample consisted of 76 Undergraduate and Graduate students majoring in Special education, General education speech and Language pathology, and School psychology. The findings indicated that pre-service school personnel (a) had higher knowledge scores than reported in previous literature and (b) were less aware of the lack of long-term efficacy data and the side effects of medication. Independent Samples 't' test indicated that there were no differences between the graduate and undergraduate student groups on the overall knowledge scores. Based on the results, it is recommended that the side-effects of stimulant medication should be incorporated within the teacher education curriculum.

Keywords: ADHD, Pre-Service School Personnel Knowledge of Stimulant Medication, Side Effects of Stimulant Medication, ADHD Characteristics

INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most commonly diagnosed psychiatric disorders among children today (Cornell-Swanson, Frankenberger, Ley, & Bowman, 2007). ADHD is a lifelong disability. It affects approximately 5% of the children worldwide (Breuer, Gortz-Dorten, Rothenberger, & Dopfner, 2011). Recent estimation from the Center for Disease Control (CDC) indicates that 8.4% or 5.2 million children between the ages 3-17 are diagnosed with ADHD in the United States. It affects individuals from all cultures and socioeconomic levels (Morisoli & McLaughlin, 2004) and more boys are diagnosed with ADHD than girls (Gracia, 2009; Morisoli & McLaughlin, 2004). To be diagnosed with ADHD, children need to exhibit several symptoms in the areas of inattention, impulsivity, and/or hyperactivity over a period of six months, in multiple settings (for example, school and home), and before 12 years of age (American Psychiatric Association, 2013).

There are three major sub-types of ADHD. These are (a) Intention, (b) Hyperactivity/impulsivity, and (c) Combined type (inattention and hyperactivity/impulsivity). Teachers usually are the first to notice these symptoms and refer students because of the inappropriate behaviors and/or poor academic performance. Students with ADHD are often labeled by teachers as being lazy, having difficulties with directions, having difficulties with completing assignments, having difficulty with paying attention, and having limited friends (Small, 2003). According to Barkley (2006), students with ADHD exhibit (a) limited sustained attention, (b) reduced impulse control, and (c) excessive activity unrelated to the task. The above characteristics negatively affect the students with ADHD in the areas of (a) academic engagement, (b) academic performance,

and (c) social interactions. Students' inability to sustain attention affects their ability to complete their classwork and homework (Garcia, 2009). This in turn results in a significant academic underachievement. Previous literature indicates that inattention and hyperactivity is negatively associated with reading and math achievement (Barry, Lyman, & Klinger 2002; Daley & Birchwood, 2010; Loe & Feldman, 2007). Similarly, based on their meta-analysis of literature, Frazier and colleagues indicated that adolescents with ADHD displayed significantly lower levels of academic achievement than their peers (Frazier, Youngstrom, Glutting, & Watkins, 2007).

The symptoms of distractibility, impulsivity, hyperactivity also affect the social skills of students with ADHD. In particular, their lack of response inhibition affects their social interactions with peers and authority figures and their ability to follow classroom norms, which results in social isolation and frequent discipline referrals and punishment. Students with ADHD also have difficulties with pivotal social skills such as taking turns, socializing appropriately, and recognizing and responding to social situations (Garcia, 2009). Further, they also talk excessively, and interrupt conversations (Daley & Birchwood, 2010). Students with ADHD also exhibit co-morbid disorders such as oppositional defiant behaviors, bipolar disorders, learning disability and/or conduct disorders (Daley & Birchwood, 2009; Snider, Busch, & Arrowood, 2003).

Students with ADHD are provided accommodations to meet their needs either through a Section 504 of the Accommodation Plan or through an Individualized Education Program under the Individuals with Disabilities Education Improvement Act (IDEIA) of 2004 in the US. Under Section 504 of the Vocational Rehabilitation Act, schools, which receive federal monies, are required to provide accommodations so as to provide the students with access to education that is comparable to their peers. Under IDEIA, students with ADHD are served under the category of Other Health Impairments due to their limited engagement with the academic tasks as a result of their heightened alertness to environmental stimuli. To qualify under IDEIA, students' symptoms must be chronic or acute and should adversely affect their educational performance (Small, 2003). IDEIA explicitly states that school personnel cannot obtain prescription as a condition for receiving evaluation or special education services (Ryan & Katsiyannis, 2009). At the same time IDEIA does allow school personnel with (a) the dispensing of medications and (b) having direct communications with the parents regarding the effects of medications (Ryan & Katsiyannis, 2009).

Stimulants are one of the commonly used interventions to decrease off-task and disruptive behaviors of students with ADHD (Daley & Birchwood, 2010). In the recent years, there has been a substantial increase in the use of medication with ADHD students in the US. Stimulants are commonly prescribed medication to children with ADHD to improve their attention span and to decrease distractibility, hyperactivity, and impulsivity (Morisoli & McLaughlin, 2004; Snider, Busch, & Arrowood, 2003; Wegrzyn, Hearrington, Martin, & Randolph, 2012). Approximately, 66% of the children take daily medication (Center for Disease Control, 2010; Wegrzyn, Hearrington, Martin, & Randolph, 2012). There are different types of stimulants based on their release cycles. Some common types are (a) short acting, (b) intermediate, and (c) long acting. Stimulant medication increases dopamine and nor-epinephrine levels in individuals with ADHD. An increase in dopamine levels is hypothesized to improve the attention and motivation of the child and an increase in nor-epinephrine levels is hypothesized to improve the levels of alertness and energy of the student with ADHD. Stimulants also have side effects and are not effective with all individuals with ADHD. Some common side effects of stimulants include headaches, upset stomach, increased blood pressure, decreased appetite, weight loss, nervousness, insomnia, and a decrease in the rate of physical growth (Snider, Busch, & Arrowood, 2003). Given the increased use of stimulant medication, school personnel need to be aware of the implications and effects of the stimulant medications on a child's academic and behavioral performance. It is important so that they can effectively communicate the side effects to parents and also plan for accommodations based on the

side effects.

However, educators' knowledge of the effects of stimulants is limited. Kasten and colleagues found that 50% of the teachers did not have knowledge of the physical and behavioral side effects of stimulants (Kasten, Coury, & Heron, 1992). Similarly, Davino and colleagues found that 55.8% of the teachers were unaware of the side effects of stimulants (Davino, Lehr, Leighton, Miskar, & Chambliss, 1995). Furthermore, Cornell-Swanson and colleagues reported that teachers are very aware of the positive effects of medication and less aware of the side effects and the lack of long-term data efficacy on medication (Cornell-Swanson, Frankenberger, Ley, & Bowman, 2007).

Sciutto and colleagues examined the knowledge of elementary school teachers using the 'Knowledge of Attention Deficit Disorders Scale' (Sciutto, Terjesen, &Frank, 2000). They concluded that, teachers have limited knowledge of the cause, treatment, and prognosis and called for improved in-service training of teachers. Similarly, West and colleagues examined teachers and parents knowledge of ADHD using the 'Knowledge about Attention Deficit Disorder Questionnaire' (KADD-Q) (West, Taylor, Houghton & Hudyma, 2005). The results indicated that teachers and parents had greater knowledge of the causes of ADHD than the characteristics of ADHD and treatment options. The results also indicated that the scores/knowledge of parents were significantly higher than that of the teachers.

More recently, Snider, Busch, and Arrowood (2003) examined the general and special educators' knowledge of ADHD and stimulant medication. They randomly surveyed 145 general and special education teachers using a four-page questionnaire. The results indicated that teachers (both general and special education) had limited knowledge about ADHD and stimulant medication and that there were no differences between the general and special education teachers on the 13 factual knowledge questions about ADHD and stimulant medication. The results also indicated that teachers were uninformed about the side effects of stimulant medication and that professionals needed more information about stimulant medications and their side effects. Based on the findings, the authors called for all teacher education programs to include content related to ADHD and stimulant medication as part of the teacher education curriculum.

Given that educators are the primary persons referring students with ADHD and that stimulant medication is commonly used, it is essential for educators to be knowledgeable about ADHD and the benefits and risks associated with stimulant medications (Ryan & Katsiyannis, 2009). Previous literature indicates that general education teachers have little knowledge of ADHD and receive information on ADHD from magazines (Garcia, 2009; Small, 2003; Snider, Busch, & Arrowood, 2003). Thus, there is a need to examine pre-service personnel's knowledge regarding ADHD and stimulant medication.

Objectives

The present study examined (a) pre-service school personnel's knowledge of ADHD and the effects of stimulant medication on academic and behavioral performance of students with ADHD and (b) the differences in knowledge levels between the graduate and undergraduate students.

Method

Sample

The sample consisted of pre-service educators taking the introductory course in special education at the undergraduate and graduate levels at a major urban University. A total of 76 students majoring in special education, general education, speech and language pathology, and school psychology participated in this study. The sample consisted of 36 undergraduate students and 40 graduate students.

Questionnaire

Only the 13 factual questions developed by Snider, Busch, and Arrowood (2003) were used to assess the pre-service educators' knowledge of ADHD and stimulant medication. The questions were reconstructed as true/false statements to assess educators' knowledge of stimulant medication and ADHD. The questions elicited

students' knowledge of ADHD, causes of ADHD (three questions), and effects of stimulant medications (nine questions) (Snider, Busch, & Arrowood, 2003).

Procedure

Students in the introductory course on special education were initially provided an overview of ADHD as a part of the course. No information on the medication or stimulants was provided in this initial presentation. Next, the questionnaire consisting of the 13 factual questions (developed by Snider, Busch, & Arrowood, 2003) was administered to pre-service educators as part of a class activity. The students answered the questions independently. The author then elicited the students' responses and provided the correct answers. Students were asked to mark their incorrect responses with a different colored pen/pencil. Students' responses were collected at the end of the class and the student pre- and post-scores were entered into the 'Statistical Package for the Social Sciences' database by the author. All the entries were double checked by a graduate student for errors. Once the data was entered, a 't' test was conducted to examine the differences in knowledge between the UG and graduate students. Students' total scores on the 13 factual questions were used to examine the differences between the UG and graduate students. Finally, a descriptive analysis for each question was undertaken.

Results

The results of the independent samples t-test indicated that there was no difference between the graduate and UG groups at the .05 level, t (74) = -1.681, p = .097 as shown in Table 1. The graduate student group had a higher mean score of 10.2 (SD of 2.22) compared to the UG student group, which had a mean score of 9.22 (SD of 2.84).

Overall descriptive analysis indicated that, 11 of the 13 items are answered correctly by more than half of the pre-service school personnel. The two items that the pre-service educators (both UG and graduate) had lower scores or answered incorrectly were (a) children with ADHD exhibit similar amounts of problematic behaviors when on stimulants and (b) stimulants positively influence academic achievement in the long run as shown in Table 2. Furthermore, 27 to 41percent of the sample answered three other questions incorrectly. These statements were (a) ADHD is caused by brain malfunction, (b) one can confirm diagnosis of ADHD if stimulant improves attention of the child, and (c) physical growth rate of children is decreased when on stimulants. When analyzed for differences between graduate and UG students, 44.4% of the UG and 37.5% of the graduate students incorrectly identified that brain malfunction causes ADHD. Similarly, 44.4% of the UG and 25% of the graduate students incorrectly identified attention improvements after medication confirms ADHD diagnosis as given in Table 2.

Group	n	Mean	SD	t-cal	Df	p	Decision
UG	36	9.22	2.84	-1.68	74	.097	Reject
Grad	40	10.2	2.22				

Table 1. t-Test Comparing UG and Graduate Students' Knowledge of ADHD and Stimulants

When analyzed for the differences between graduate students and UG students in answering the 13 factual questions, a greater percentage of graduate students answered three statements/questions incorrectly than the UG students. These were (a) ADHD symptoms may be caused by academic deficits, (b) stress and home conflict can cause ADHD symptoms, and (c) a diagnosis of ADHD can be confirmed if stimulant medication improves attention. A greater percentage of UG students scored lower on the other 10 questions than the graduate students. The greatest difference between the graduate and UG students was on two statements on the effects of stimulants. Approximately, 55% of graduate students and 36.1% of the UG students correctly identified that student with ADHD who is on stimulants exhibit similar amounts of problem behaviors as their peers as incorrect as shown in Table 2. Similarly, 52.5% of the graduate students and 33.3% of the UG students correctly indicated that the statement "stimulants have positive effect on academics in the long run" as false. Furthermore, 1/3rd of the UG students incorrectly identified that stimulants affect the growth rate of the student.

Discussion

The results of the study indicate that there are no

Statements about ADHD and stimulant medication*	Overall	UG	Grad
Commonly diagnosed disorder	89.5%	88.9%	90%
ADHD is caused by brain malfunction	59.2%	55.6%	62.5%
ADHD symptoms are caused by academic deficits	77.6%	83.3%	72.5%
ADHD symptoms are caused by stress and home conflict	81.6%	88.9%	75%
Attention increases due to stimulants confirms ADHD	65.8%	56.6%	75%
Stimulants may decrease rate of physical growth	72.4%	66.7%	77.5%
Stimulants may produce tics	81.6%	75%	87.5%
Stimulants abuse potential is similar to cocaine, morphine, and Demerol	93.4%	88.9%	97.5%
Stimulants long- term effects are well understood	88.2%	77.8%	97.5%
Stimulant loses it effectiveness overtime	88.9%	80.6%	85%
Students on stimulants exhibit same amount of problem behaviors as their peers	46.1%	36.1%	55%
Stimulant improves behavior according to short -term studies	92.1%	91.7%	92.5%
Stimulants positively effect academic achievement in the long run	43.1%	33.3%	52.5%

Note: *Statements adapted from "Teacher knowledge of stimulant medication and ADHD" by V.E. Snider, T. Busch, and L. Arrowood, 2003, Remedial and Special Education, 24, p.50.

Table 2. Percentage of pre-service school personnel who correctly rated statements on ADHD and the effects of stimulant medication.

differences between the graduate and UG students' knowledge of ADHD and stimulant medication. The descriptive analysis indicated that less than 50% of the students answered correctly, 2 of the 9 questions/ statements on the effects of stimulant medication. Furthermore, there were differences between the graduate and UG students on many statements with the graduate student group scoring lower on three of the 13 questions and UG student group scoring lower on the other ten questions.

The findings of this study indicate that pre-service school personnel, both at the UG and graduate level, had higher knowledge scores than those reported in previous literature. For example, previous literature indicated that 50% of the teachers were unaware of the physical side effects of stimulants (Kasten, Coury, & Heron, 1992) and 55.8% of the teachers did not have knowledge of the side effects of stimulants (Davino, Lehr, Leighton, Miskar, & Chambliss, 1995). In this study, only 27.6% of the pre-service educators answered the question on physical growth rate incorrectly and more than 65.8% of the pre-service educators answered seven of the nine questions on stimulant medication correctly.

Second, the result of the study supports previous literature by Cornell-Swanson and colleagues who indicated that educators are less aware of the lack of long-term efficacy data on medication (Cornell-Swanson, Frankenberger, Ley, & Bowman, 2007). In this study, only 43.4% of the pre-service educators answered the question/statement correctly.

Third, more than 25% of the pre-service teachers are still not fully aware of the effects of medication (on the growth rate, problem behavior, long term effects, etc.). These misconceptions need to be addressed in the teacher education curriculum as advocated by Snider, Busch, and Arrowood (2003). This is vital as school personnel can play key roles in (a) monitoring the side effects of stimulants, (b) making accommodations for side effects, and (c) communicating the side effects/observations with parents.

Limitations

First, the results of the study have limited generality as the sample was a convenience sample and was not randomly selected. Thus, the respondents may not be representative of the pre-service school personnel. So the results of the student are not generalizable and should be inferred carefully. Second, only a part of the questionnaire that was developed by Snider, Busch, and Arrowood (2003) was used in the study and the respondents were only provided true/false options. They were not given the option of "don't know" and this could have affected the overall scores. Future researchers should examine if the use of "don't know" category would provide a more accurate picture of pre-service school personnel's knowledge. Third, the data presented in the study is a single snapshot of the pre-service educators' knowledge during their introductory course in special education. Thus, it does not represent their summative knowledge at the time of their graduation and should be interpreted accordingly.

Conclusion

The findings of the study extend previous literature in that it examines the common misconceptions of stimulant

medications among pre-service school personnel. The findings concur with previous research in that school personnel have some common misconceptions of the side effects of stimulant medication. This calls for teacher education programs to include the content that address these misconceptions.

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